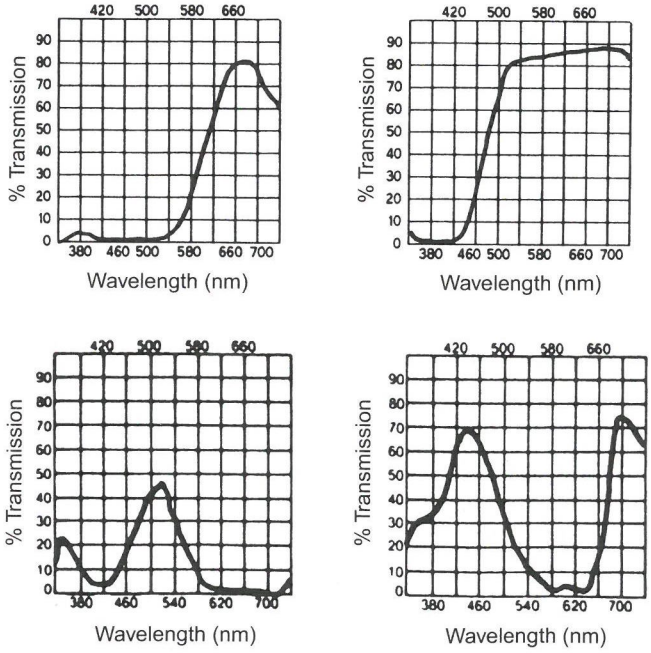
Problem Set #1

Due Monday, February 23 by 5pm to Dickinson 104

1. There are some truly scarily-powerful laser pointers out there available to the general public. Biglaserpointers.com will sell you "Jupiter - The Most Powerful Handheld Burning Laser Pointer," with a wavelength of 450 nm. It will also sell you the more reasonable "Tinystar Best Office Presentation Laser Pointer," with a wavelength of 650 nm.
    a. One of these is a blue laser pointer and one is a red. Which is which? How do you know?
    b. What is the frequency of the light from each of the laser pointers?
    c. What is the energy of a single photon from each of the laser pointers?
    d. The energy you got from part (c) should be in units of Joules. One of the versions of the "Jupiter" laser pointer has an energy output of 5 Watts, which is 5 Joules per second. Using your answer from part (c) and the reported energy output from the laser pointer, calculate *how many photons* the Jupiter pointer puts out in one second.
2. Each of the following graphs shows light intensity as a function of wavelength. Describe the color you would most likely perceive if you were to look at the light portrayed in each graph. Explain your reasoning.



3. Find something that is "interestingly colored" somewhere in your life. It should be a solid color, not a gradient or a pattern and should be something more interesting than just a monochromatic shade. Describe your object. Sketch what you expect the spectrum should be. Explain why your sketch looks the way it does.

4. Four color printing uses magenta, yellow, cyan, and black inks. Which of these colors would be combined to print red on a white page? Explain. (*Hint: See Figure 8.9 of your book*)
5. Describe the colors (and explain the reasons for those colors) that you would observe if looking at the following fruits and vegetables when illuminated with ***monochromatic red light***:
    a. A yellow banana
    b. A red apple
    c. A green pepper
    d. A white onion